

#	TITLE	DESCRIPTION
1	2008 Building Efficiency Standards Research (Residential Attic Model)	The objectives of this project are to develop and introduce a new residential attic model for use in standards development and compliance, produce a compliance option for indirect direct evaporative cooling systems, produce revised residential ventilation requirements and accompanying models for use in standards development and compliance, and explore options for developing standards for the energy efficiency of air handler fans in residential heating, ventilation and air conditioning (HVAC) equipment.
2	2008 Title 24 Codes & Standards Enhancement for Residential Cool Roofs	This project will draw from information from monitoring studies as well as public workshops to develop a Codes and Standards Enhancement (CASE) proposal for the 2008 revision of California Title 24. The development of residential energy standards can help to establish cool roofs in the marketplace, which is necessary for success of the manufacturers of these products. If enacted this code change will encourage the adoption of colored cool roof technology in the residential, high slope building sector.
3	A Building Integrated Damper to Improve Comfort with Evaporative Cooling	
4	Advanced HVAC Systems for Improving Indoor Environmental Quality and Energy Performance of California K-12 Schools - Program Admin	The purpose of this program is to develop and demonstrate innovative HVAC systems for California schools that will improve indoor air quality, save energy, and reduce peak demand. This research effort will involve all the school-related institutions that govern or guide school building construction in California, including the California Department of Education, the Office of Public School Construction, the Division of the State Architect, the Coalition for Adequate School Housing and the Collaborative for High Performance Schools.
5	Advanced Roof Top Air Conditioning Unit (ARTU)	The advanced roof-top unit, or ARTU, is a development project to design a prototype with a set of features making it more resistant to breakdowns. Once these features have been identified and the unit has been built and tested, the Consortium for Energy Efficiency, an association of utilities and efficiency advocates, will be encouraged to adopt the specification for an advanced performance tier. Utilities may then provide incentives for units meeting the specification to be installed, which encourages manufacturers to build them.
6	Advancement of Electrochromic Windows	This project is examining the issues of integrated lighting control with window tint control in the context of visual comfort and energy efficiency, as well as the overall performance of electrochromic windows using a specially designed test facility. It will provide an assessment of the technology and essential information for designers and architects to understand and use these windows. It will provide feedback to the window manufacturers on issues of control accuracy, reliability, and physical characteristics such as opacity.
7	Advancing Digital Lighting Controls	
8	Affordable Multi-Family Zero Energy New Home (ZENH) Project	This project entails the design of two multi-family affordable housing units in order to demonstrate the feasibility of building low-cost housing that incorporates high-level efficiency and photovoltaic systems. This project will further develop financial instruments to address funding issues associated with housing that incorporates these features. Finally, this project seeks to address current knowledge gaps relating to the benefits and feasibility of energy efficiency and PV systems.
9	Affordable Zero Energy Homes	
10	AHU/VAV Diagnostics	Researchers at the National Institute for Standards and Technology are developing diagnostics for air handlers and air terminal equipment that can be readily implemented by controls companies. Technical assistance and field trials are being conducted to work the bugs out of this system and help the controls companies to implement the diagnostics within their product lines.
12	Assessing Building Vulnerability to Chemical and Biological Threats	
13	Automated Rooftop Air Conditioning at Target and HVAC ePrimer	Project 1: LBNL will develop an automated fault detection procedure for packaged air-conditioning units connected to Building Automation Systems. The project will focus on rooftop units in retail stores and leverage the current energy efficiency research collaboration between LBNL and Target Corporation. LBNL will develop a method to automate the fault detection process for roof top units, implement it in a software tool and test it in Target stores in California. Project 2: LBNL will work with The Deringer Group at Berkeley to extend the ePrimer HVAC training software developed by The Deringer Group and LBNL. Energy-efficiency and peak demand analysis capabilities will be added to ePrimer by incorporating the EnergyPlus simulation program, incorporating the VizTool advanced performance visualization tool and developing associated learning scenarios.
14	Battery Charger and Power Supply Standards Evaluation	This research will identify the technical opportunities and policy strategies that will improve battery charger efficiency and power supply efficiency in a variety of consumer electronics. The team will meet this goal by researching and characterizing the battery charger and power supply market; by gaining industry consensus on how to measure and report battery charger efficiency and internal power supply efficiency; by analyzing the energy consumption and savings potential of products that use battery chargers and internal power supplies; and by creating voluntary and mandatory energy and environmental policy recommendations that would potentially benefit Californians through lower energy bills.
15	Benchmarking California Buildings	
16	Berkeley Lamp Applications Study: Michael Siminovitch/UC Davis	

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17	Best HVAC Practices for Residential and Small Commercial Systems	This project would identify the best known practices for air conditioner and duct system selection, installation, diagnosis and repairs, based on prior PIER and other work. It would develop this information into a format suitable for developing classroom and laboratory instruction. It would document critical laboratory facilities and tools for teaching diagnostic techniques. The information would be coordinated with teaching faculty to ensure usefulness. The overall purpose of this project is to develop materials which lead to teaching technicians the most effective methods for evaluating, diagnosing and correcting energy-wasting faults in air conditioning equipment.
18	Building Commissioning - Innovation to Practice	The purpose of this project is to develop and introduce innovative and practical performance testing and diagnostic tools and training for commissioning agents and building owners in California, New York, Texas, Nebraska, Iowa, Oregon, Washington, Idaho, and Montana. To address these needs, the California Energy Commission (CEC) has teamed with the New York State Energy Research and Development Authority (NYSERDA), the Texas Engineering Experiment Station (TEES), the University of Nebraska-Lincoln (UNL), and the Oregon Department of Energy (ODOE), to implement a National Association of State Energy Officials' project in the Building Technologies area.
19	Building Energy Performance Benchmarking Development	The proposed work with ORNL will provide statistical analyses of California's newest commercial building energy use data, the 2002-2003 Commercial End Use Survey (CEUS). The results of ORNL's analyses will be incorporated into the benchmarking tool to be developed by LBNL (see Decision Memo ITEM 2) This proposed work is part of the PIER Buildings Program '05-'06 budget plan, under the budget category: Develop Tools in Support of Governor's Green Building Executive Order.
20	Center for the Built Environment - Collaborative Research Agreement	The Center for the Built Environment (CBE) at the University of California at Berkeley is an industry-university cooperative research center devoted to improving commercial building design. The mission of CBE is to provide timely, unbiased information and research on promising new building technologies and design techniques. This project provides the PIER Buildings program with CBE membership privileges.
21	Classroom HVAC: Improving Ventilation and Saving Energy	This project will develop, evaluate, and demonstrate a very practical heating, ventilation and air conditioning (HVAC) system for classrooms that provides classrooms effective continuous ventilation with less noise than current systems while saving energy. The specification of this system will be made public domain, and PIER will promote its acceptance into the market through interaction with our partner BARD and other key California school facilities stakeholders.
22	Commercial Building Commissioning R&D	The California Commissioning Collaborative (CCC) is a non-profit organization dedicated to making building commissioning common practice in California. This contract proposal will employ the unique nature of the CCC to help manage new commissioning-related R&D for the PIER Buildings portfolio over the next three years. The market research project aims to clearly characterize the value of commissioning for building owners and decision makers as well as develop technology transfer strategies. Additionally, Cx and RCx tool projects will provide strategic resources for commissioning providers, helping them to market and deliver their services consistently and cost-effectively.
23	Commercial Gas Fryer for Food Service	This purpose of this project is to design, develop and test a commercially viable gas fryer that reduces energy costs, improves performance, and reduces oil consumption. The contractor will develop specifications and fryer designs concepts; fabricate, assemble, and bench test the fryer; and then conduct computational fluid dynamics tests to analyze both heat transfer and combustion. A prototype fryer will be built and tested according to ANSI and ASTM standards. The contractor will also develop a California market transformation plan outlining activities that Pitco, the key partner, can use to introduce the new gas fryer product.
24	Conceptual Design Energy Analysis Tool Phase 2	This project is intended to give building designers feedback on building energy use early in the design process. This will enable them to make informed decisions on cost-effective design modifications with large energy impacts.
25	Cool Ducts	This project team will examine the efficiency improvements possible by coating exposed ductwork with cool coatings. They will also examine the improvements to system efficiency which result from the air conditioner being located on a cool rather than a standard roof. If significant benefits are found, proposals for Title 24 revisions will be made.
26	Cool Roof Colored Materials	The purpose of this project is to develop cool colored roofing materials. This project involves development and field testing of roofing materials using special pigments which are highly reflective in the invisible infrared portion of the spectrum. These materials reject a significant amount of solar radiation but retain a normal colored appearance. Composition shingles, concrete and clay tiles, and metal roofing materials will be developed in cool colors. Short and long-term monitoring of the materials in various climate zones will help assess life cycle costs and susceptibility to degradation.
27	Cooling Solutions Collaborative Program	The purpose of this project is to conduct natural gas cooling options technology development and advanced field testing. Gas cooling provides an alternative to electric powered commercial cooling, potentially mitigating peak electric demand in the high-growth areas of California's hot dry valleys. Applicable technologies include both absorption cooling and gas-engine-based vapor compression cycles. This co-funded project has many gas utilities throughout the country taking part.
28	Cost Effectiveness of commissioning New and Existing Buildings	

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29	Demonstration of a New, High-Efficiency Air-Conditioning System	This project is to demonstrate a new air-conditioning system in a Southern California coffeehouse. The system, designed and patented by CoolSmart, LLC, shows promise for greatly reducing energy use and peak electric demand for cooling commercial buildings. The demonstration should also show if the system satisfies comfort and operating requirements for the building and identify remaining design issues for future work. CoolSmart's system differs from conventional air conditioning in that it separates dehumidification and sensible cooling, allowing for most of the cooling to be done at a higher evaporating temperature.
30	Develop Recommendations to Improve Hot Water Equipment and System Efficiencies in California Homes	This project will include several research tasks with the purpose of increasing the energy and water efficiency of residential water heaters and hot water distribution systems (HWDS). The first tasks focus on providing HWDS data, analyses, and recommendations to the 2008 Title 24 Residential Building Energy Efficiency Standards proceeding. The second set of tasks consists of three pilot phase or feasibility studies that will be used to plan future RD&D projects to assess residential hot water usage patterns, and to improve the efficiency of water heating technologies and distribution systems.
31	Development of Recommendations to Integrate Emerging Technologies into the 2008 Nonresidential Standards	The purpose of this project is to use EnergySoft's extensive experience with California's Building Energy Efficiency Standards to evaluate finished PIER Buildings' products that are thought to be ready for adoption into the 2008 Standards. The evaluation will develop detailed 2008 Standards recommendation reports for each reviewed PIER product. This project also funds EnergySoft to comprehensively review the existing set of ACM (Alternative Calculation Method) test files that are used in the performance-based nonresidential compliance approach and to develop a detailed development report on how to update the test files to current modeling standards.
32	Duct Leakage Modeling in Energy Plus	
33	Duct Tape Durability Testing - Final Phase	
34	Effectiveness of UVC Technology for Improving School Performance	The purpose of this project is to determine if ultraviolet light in the "C" band (UVC) is effective in reducing heating, ventilation and air conditioning (HVAC)-related mold and mildew, thereby improving indoor environmental quality (IEQ) and energy savings. If a positive correlation between the UVC lights and student attendance or evidence of energy savings is found, the Contractor will then develop materials that can be disseminated to members of the building community. The Contractor will also research possibilities for future studies that will further quantify potential energy savings of the UVC technology through fieldwork and lab testing.
35	Efficient Commercial Comfort Systems	The purpose of this project is to develop commissioning techniques and Title 24 proposals for Underfloor Air Distribution systems, extend Center for Built Environment advanced comfort model to window zones, comfort surveys for radiant cooling systems.
36	Energy Efficient Digital Networks	The goal of this research project is to save 2,300 GWh/year of electricity by improving the energy efficiency of digital networks. This will be achieved by developing standards, specifications and technologies to improve the energy efficiency of network connectivity in information technology and consumer electronics.
37	Energy Efficient Natural Gas Chillers, Water Heating and Food Service Equipment	The proposed research will create a roadmap for advancing technology in the gas-fired commercial water heating systems and gas fired commercial food service areas within the food service industry. The research will also provide the basis for developing and advancing the focus on natural gas cooling as well as proving opportunities for future research in this area.
38	Energy Savings in Electronics	1. The research will identify and prioritize, based on duty cycle, the electronic end uses in the commercial and medical sectors that represent the best opportunities for reducing energy consumption. 2. This research will assist us in understanding how we can better plan for the future and develop policy on electronic equipment by knowing how it impacts the grid. 3. This research will develop a standard test procedure and measurement approach that will allow for development of future appliance efficiency standards. 4. This research will identify ways to improve secondary power supplies. 5. This research will develop a design guide for the computer industry.
39	Energy Star Beverage Vending Machine	The purpose of this project is to develop practical high efficiency beverage vending machine in conjunction with case manufacturer.
40	Establish and operate the California Lighting Technology Center	Establish the California Lighting Technology Center (CLTC) at University of California, Davis. The mission of the CLTC will be to advance the application of efficient lighting technologies through research, education, and outreach. The CLTC will be a unique partnership between the National Electrical Manufacturing Association (NEMA), California utility companies, the California building industry, specific lighting corporations, the National Resource Defense Council (NRDC), the U.S. Department of Energy, and California universities and colleges to encourage the development and market adoption of energy-efficient lighting products.
41	Evaluating the Use of Energy Plus for 2008 Nonresidential Standards Development	

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42	Field Study of the Impacts of Underfloor Air Distribution	The California Energy Commission and the Department of General Services (DGS), through an Interagency Agreement, will jointly fund a field study of the impacts of underfloor air distribution in new office buildings. The Capitol Area East End Complex, a recently completed state office building construction project, will be the site for this field study. The Center for the Built Environment, a research organization within the University of California, Berkeley will conduct this field study under contract to DGS.
43	Final Phase Research - HPCBS Program	The goal of this research program is to develop and demonstrate advanced tools, technologies and building systems that will economically deliver significant energy and peak demand savings and enhance the indoor environment of commercial buildings in California.
44	Green Building Studio Enhancement	The purpose of this project is to add design alternatives functionality to the Green Building Studio (GBS) web service. This addition will give GBS the capability to provide users multiple design iterations within the same GBS project, greatly facilitating side-by-side energy performance comparisons of design changes.
45	Green Guideline Specifications for Commercial Buildings	
46	High Performance Building Façade Solutions	The project will seek opportunities to enhance energy-efficiency performance of commercially available, albeit sub-optimized and underutilized building glazing and façade technologies and systems that can be rapidly modified to address performance feedback from simulation, field studies, manufacturers, and designers. Project activities will define the savings potentials in California, establish and quantify the improvements and enhancements needed for commercially-available technologies, establish partnerships with manufacturers to develop the improved systems and verify that the systems deliver the expected savings and amenities, so as to stimulate early adopters (designers and owners) to specify and install the systems, thereby resulting in an informed Title 24 code process while also assisting and leveraging utility Emerging Technology programs.
47	Hot Dry Optimized AC	The purpose of this project is to design and test a typical residential (3.5-ton split) and small commercial (5-ton packaged) air conditioning system optimized for California's hot-dry conditions. System specifications will be developed. A manufacturer partner will design, build and test a prototype hot-dry air conditioner that meets the specifications. Design guidelines will be developed and results will be disseminated
48	Hot Water Distribution System Research	This will be an integrated program of research that analyzes how HWDS function in the field, and what factors lead to successful outcomes. It will identify what aspects of system design, operation and maintenance offer the greatest opportunities for energy savings from utility programs and changes to water and energy efficiency standards, and which of these opportunities can most readily be achieved given cost constraints, typical design practice, available technologies and cultural factors. Many energy saving opportunities will be identified and quantified, and market change will be achieved by: •Providing evidence of achievable savings to building owners and designers. •Providing design advice to make the design process easier and cheaper. •Working with product manufacturers to improve performance and/or reliability. •Informing the development of codes and standards, and of utility programs.
49	Improvements to Refrigerated Display Case Efficiency	Air curtain designs used in refrigerated cases have remained static for many years, while tools used to simulate airflow have dramatically improved. This research proposes to investigate the basic dependence of infiltration on controllable geometric and dynamic parameters within the air curtain experimental setup. It will use the latest simulation tools to model and optimize designs for an actual prototype case. The prototype case will be constructed and tested. Because case manufacturers and merchandisers are involved with the project, improvements can be quickly implemented in production cases.
50	Improving SEER for Hot, Dry Climates	This research project will review proposals and research on small central air conditioning systems and make recommendations for improving SEER.
51	Increasing the Energy Efficiency of Vapor Compression Systems by Using "Smart" and Cost Effective Compressors	The purpose of this project is to develop optimized electrical motors and controls for AC compressors
52	Integrating Building Commissioning into the State Building Construction Process	The objective of this project is to increase the quantity and consistency of commissioning services used by the Department of General Services' (DGS) Real Estate Services Division during their new building construction processes. Project staff will work closely with key staff and management within DGS to develop procedures, protocols and specifications for commissioning new state buildings that can be integrated with and implemented through DGS procedures and personnel. In addition, this project will provide information on the costs and benefits of commissioning state buildings for use by DGS in justifying personnel and procedural changes to the state's building construction processes.
53	Investigation of Mold-Resistant Building Assemblies and Construction Practices for California Homes	The purpose of this project is to conduct an investigation of residential building construction practices and innovative building assemblies that are resistant to mold formation and growth.

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54	Lighting California's Future	Pursuant to a competitive solicitation and a 10/20/2006 Notice of Proposed Award (NOPA), carry out nine energy-efficient lighting research projects with potential to collectively deliver electrical load savings of 569 GWh/yr and 179MW of peak load. These projects will be conducted by Architectural Energy Corporation (AEC) in a coordinated program that includes a program-wide market connections element. AEC's researchers will work in partnership with lighting manufacturers and California utilities in the following areas: daylighting (tubular daylight device optics), demand response (commercial building bi-level lighting loads and integration of lighting controls with utility signals), integrated systems (retrofit classroom lighting and wireless/photosensor/motion sensor controls), and solid-state lighting (commercial LED downlights, residential/commercial hybrid downlights, LED lighting in residential fans, and advanced LED lighting for residential and commercial applications).
55	Lighting Research Program Final Phase	Re-tool Lighting Research Program products to deliver: 1) performance metrics and specifications for an Integrated Office Lighting System, 2) a consumer-priced small office/home office task light, 3) hybrid solid-state/traditional luminaires , 4) a Smart Outdoor Lighting Control System, and 5) improved functionality and utility for the SPOT sensor-placement freeware tool.
56	Lighting Research Program-Advanced Lighting Luminaires and Systems	Investigate ways to improve the functionality and energy-efficiency of lighting systems. An element of the LRP involves research into the development of energy-efficient integrated lighting systems with improved operability, maintenance, warranty, customer support and commissioning features.
57	Lighting Research Program-Advanced Lighting Technologies	Advanced lighting technologies, such as solid state lighting, could provide for significant energy conservation. An element of the LRP involves research into advanced lighting technologies by improving the efficiency, performance characteristics, and cost factors of white light emitting diode (LED) lighting and by developing practical luminaires.
58	Lighting Research Program-Demand Responsive Lighting Systems	Conduct research aimed at resolving the limitations of lighting controls. An element of the LRP involves research into demand-responsive lighting control systems, including dimming controls, load-shed ballast technology, and photosensor technology and controls.
59	Lighting Research Program-Lighting Performance Metrics, Codes and Standards	The purpose of Lighting Research Program's Lighting Performance Metrics, Codes and Standards research is to seek ways to inform building codes and design practices about new energy-efficient lighting technologies in order to fill energy efficiency gaps and realize new ways to save energy in California.
60	Lighting Research Program-Market Connection	Conduct the Lighting Research Program (LRP), a systematic research program that creates new lighting technology and products that can save energy, reduce peak demand, and reduce pollution for the citizens of California. This Program encompasses both residential and commercial sectors, as well as outdoor lighting associated with buildings. The Market Connection element is a centralized program-wide approach that improves the LRP's market focus, thereby increasing commercial viability for the Program's technology products. Integrating the research activities with lighting equipment manufacturers assists in introducing products to the market by providing technical projects with consistent product assessment and commercialization recommendations from key lighting market experts.
61	Low-Energy Cooling systems in commercial buildings	
62	Market Deployment of Colored Cool Roof Materials	The purpose of this contract is to continue to support the development, deployment and performance validation of cool colored roofing materials.
63	Market Research for Healthy Air HVAC System	
64	Modeling for Under Floor Air Distribution (UFAD)	The purpose of this project is to develop a fundamental principles model for Under Floor Air Distribution (UFAD) that can be implemented in various building simulation software tools. These tools will be used by Californian design practitioners to calculate the energy performance of UFAD systems and to compare the performance of UFAD systems with that of conventional systems. The availability of such tools will help UFAD technology achieve its full potential by enabling the design of UFAD systems that are energy efficient, intelligently operated, and effective in their performance.
65	National Building Control Information Program	The National Building Controls Information Program (NBCIP) has a mission of facilitating the adoption of energy efficient building control products through testing, demonstration, education, and dissemination of product information. It will provide the unbiased source of information on building control systems that is so needed. Through this project, NBCIP will also assist the market transfer of PIER's controls-related research, and PIER will guide the research and outreach conducted by this national program.
66	National Lighting Product Information Program	Continue to participate in the NLPIP testing program, an accredited testing and calibration laboratory that, through the support of its participating government agencies, public benefit organizations, and electric utilities, disseminates objective, accurate and timely manufacturer-specific information about energy-efficient lighting products. By doing so since 2003, the Commission has leveraged research funds from other entities towards augmentation of PIER's lighting research efforts.

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67	National Lighting Product Information Program and Daylight Dividends Initiative	The purpose of this project is to access the Lighting Research Center's National Lighting Product Information Program (NLPIP), a collaborative testing program that provides objective manufacturer-specific information on the energy-efficiency of lighting products. Sponsored by state and federal agencies, it is the only program of its kind. This affiliation also enables PIER to join in the Daylight Dividends initiative, a multi-party research effort that seeks to understand how natural light can reduce the need for energy consuming artificial lighting and to accelerate the use of daylighting for building energy savings.
68	New Housing Technology Demonstration: Richard Diamond/LBNL; FAS	
69	Next Generation Instantaneous Water Heater	The contractor will provide a review of available information on current instantaneous water heaters and conduct stakeholder interviews to identify technical and market barriers affecting the adoption of the technology in California. Current instantaneous water heater technology will be evaluated for its market potential and energy savings potential. The contractor will recommend next generation instantaneous water heater technology that can be successful in the California market.
70	NightBreeze Products	The purpose of this project was to adapt the NightBreeze technology, which is for residential ventilation cooling, to the production and custom home markets. To accomplish this, the NightBreeze technology will be integrating with another widely-marketed ventilation system and a variable speed gas furnace. Additionally, a fan coil specifically for the existing hydronic NightBreeze technology will be developed. The project will also develop an integrated multi-zone controller to improve residential efficiency, especially in two-story houses.
71	Non-Residential Buildings Action-Oriented Benchmarking	
72	Optimizing Human Factors in the Lighting Efficiency Equation	Pursuant to a competitive solicitation and a 10/20/2006 Notice of Proposed Award (NOPA), carry out three energy-efficient lighting research projects with potential to collectively deliver electrical load savings of 120 GWh/yr and 30MW of peak load. These projects will be conducted by Heschong Mahone Group (HMG) in a coordinated program that includes a program-wide market connections element. HMG's researchers will work in partnership with lighting designers, major retailers, daylighting experts and California utilities in the following areas: daylighting (daylighting metrics and office daylighting) and retail lighting efficiencies (retail re-visioning).
73	Performance Monitoring in Large Commercial Buildings	In this project LBL researchers collaborated with large property owners to develop specifications for control systems which would enable them to be used as performance monitoring and diagnostic systems.
74	Phase 3 Research into Low Power Modes: Statewide Survey	This project will identify target technologies by 1) applying a new data collection protocol at approximately 75 California homes, and 2) supplementing this on-site survey with a phone survey of 350 California homes. The resulting data will be the largest such survey ever conducted in the world and will be invaluable for identifying additional research needs related to reducing electronic equipment energy use in low power mode operation.
75	Power Supplies Efficiency Improvement	The purpose of this project is to conduct a technical and market assessment of the potential for improvements in the design efficiency of the external power supplies required on electronic devices such as cell phones, portable phones, power tools, etc. This effort will focus on investigating ways to reduce power in the active mode of operation.
76	Pre-Cooling Research-Scoping Study	Simulation and model validation in a small, well instrumented building to evaluate the potential impacts of pre-cooling buildings before to limit peak demand.
77	Program Market Connection	The purpose of this program is to develop and distribute market connection material on innovative heating, ventilation, and air conditioning (HVAC) systems for California schools that will improve indoor air quality, save energy, and reduce peak demand. This research effort will involve providing material to many of the school-related institutions that govern or guide school building construction in California, including the Division of the State Architect, the Coalition for Adequate School Housing, and the Collaborative for High Performance Schools. Additionally, information will be provided to utilities and major manufacturers, and presented at national conferences.
78	Programmable Communicating Thermostats (PCTs)	This project's purpose is to evaluate the economic benefits of demand response enabled by programmable communicating thermostats (PCTs) for the 2008 California Title 24 Standards and to identify and review relevant CPUC, CEC, and Federal Energy Regulatory Commission (FERC) proceedings which may impact demand response value and deployment in California.
79	Residential Retrofit Commissioning	The purpose of this project is to merge scientifically validated diagnostic and repair techniques for residential thermal comfort systems with the business practices of existing contractors. A group of selected contractors will assess which diagnostic methods can be incorporated into a contractor's practice. The methods will be documented and training materials developed. The net benefits will be validated with before and after energy use monitoring and occupant surveys.
80	Residential Ventilation Standards Research	This project will examine the relationship between ventilation and health by using the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) American National Standards Institute (ANSI) code 62.2-2003 and by examining how this code differs from current Title 24 Building Energy Efficiency code requirements. This project will propose changes to ventilation requirements in Title 24, analyze the energy impacts of these changes, and recommend standards credits and compliance paths for residential ventilation technologies.

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81	Roof Top Air Conditioning Unit (RTU) Diagnostics	This project builds on research from Purdue University's Herrick Labs and at Field Diagnostics Services, Inc, to develop and deploy practical diagnostics for roof top air conditioning units. If found to be economically practical the diagnostics may be marketed by a major controls company that has found a great amount of interest in the commercial market for this product.
82	Solar Access Design Tools for Community Planning and Building Energy Code Development	BEopt currently uses the DOE2 and TRNSYS simulation engines. BEopt finds optimal and near-optimal designs based on discrete building options reflecting realistic construction options. We proposed to develop BEopt-CA, a version of the BEopt software for use with the Micropas simulation engine for the development and application of California's Residential Building Energy Standards. We also propose to develop a Subdivision Energy Analysis Tool (SEAT) that provides feedback on energy impacts from street layout design. Based on user inputs, simulations are pre-run for a range of house orientations and home designs. As the user develops a street layout the tool interactively displays energy impact results. Potential users include: developers, site planners, planning departments, utilities, government agencies, researchers, educators, etc.
83	Speciflow	The Speciflow project will develop the means to correlate airflows within families of damper and air handler equipment to minimize the calibration requirements for manufactured products using only the outside air dampers of air handling equipment at small damper openings, which is the critical minimum airflow point. Additionally this project will measure airflows at higher damper opening positions.
84	State Parternship for Energy Efficient Demonstrations	The purpose of this program is to form a partnership with the UC and CSU to both demonstrate current technologies, and also employ California university campuses as testbeds for continuing research in real-world environments. This program will thus improve the energy efficiency of California college campuses by implementing energy efficiency retrofits, facility retro- and continuous-commissioning, including extensive permanent energy monitoring at the building and subsystem level, and energy efficient education and best practices development and training.
85	Super Efficient Gas Water Heating Appliance Initiative	This effort will fund the first phase of the Super Efficient Gas Water Heater Appliance Initiative (SEGWHAI), to develop the foundation for this multi-year initiative. This work will include the technical and market analyses necessary to determine the best ways to facilitate achieving a 30% efficiency improvement in gas water heaters. At the end of this first year, this initiative should be at the beginning of the prototype development stage.
86	Support for the Residential Hot Water Distribution System Research Project	
87	Technology Transfer for IBECS: Francis Rubinstein/LBNL	
88	Thermal Displacement Ventilation (TDV) in Schools	The purpose of this project is to develop and demonstrate thermal displacement ventilation (DV) cooling for California classrooms sites in Roseville and San Juan Capistrano. It has many advantages over conventional systems including better acoustics, greater energy efficiency, excellent ventilation effectiveness, and cleaner and healthier air in general. With DV, outside air is delivered at about 65°F to each classroom. Air is delivered near the floor and exhausted near the ceiling. The cool fresh air at the floor rises as it is warmed by occupants or other heat generating objects in the space quietly cooling and removing polluted air.
89	Utility-Focused Market Model for Zero Energy New Homes	This project will explore business models for development, design, construction, financing, and ownership of ZENHs so that ZENHs may become a mainstream component of new home construction. This contractor will: 1) Design and demonstrate ZENH concepts in a subdivision.2) Develop commissioning guidelines to ensure the homes meet design and performance specifications. 3) Develop market models for PV ownership to be implemented during the demonstration project.4) Monitor performance of the market model.5) Evaluate performance of the homes relative to the ZENH goals and benefits to the electric utility. 6) Develop improved market models for a utility pilot program.
90	Water Heating and Hot Water Usage in California Homes	The proposed research will continue efforts to characterize residential hot water usage through a partnership with the Department of Water Resources (DWR). This project will measure how much water and energy is wasted in HWDS in California residences and investigate the effectiveness of current retrofit options in reducing this waste of water and energy. This research will also continue supporting the market introduction of efficient gas storage water heaters by providing evaluations of promising technology innovations. This project will conduct efficiency tests on three promising, alternative storage-type gas water heaters. The proposed research also includes the continuation of efforts to collect the necessary data, conduct analysis and develop recommendations for energy-related code changes to improve the efficiency of HWDS.
91	Web-Based Diagnostics	This project will develop a system for analyzing performance data from air handlers and central plant equipment in order to detect faults. The information will be transmitted to a central processing location, where the maintenance and upgrading of the diagnostic software can be carefully controlled. The diagnostic information will be made available to facility owners and managers, and potentially to third-party maintenance organizations.
92	Assistance to PIER Energy Efficiency Office: Holly Larsen/LC	
93	American Council for an Energy-Efficient Economy (ACEEE)	
94	UC Technical Expertise for PIER Buildings Area Lighting Research Program	This project provides technical assistance to PIER's lighting research work
95	Development of Methodology to Evaluate Efficiency Research and Development Initiatives for the PIER Natural Gas Program: James McMahon	

#	TITLE	DESCRIPTION
96	Lighting Research Center Partners Program Membership	See next project, a continuation of this now-completed project.
97	Three Year Collaborative Research with Lighting Research Center	Collaborate in the Lighting Research Center (LRC) Partnership program in order to help steer the direction of research and take advantage of the LRC's R&D efforts in many areas of lighting research such as human responses to indoor and outdoor lighting and lighting technology evaluation. PIER will also be able to leverage the research funds of other entities in helping to solve California's energy efficiency needs.
98	UC Technical Expertise for PIER Buildings Team's Lighting Research Program	
99	PIER Buildings Program Tech Transfer Initiative	The purpose of this project is to produce a series of fact sheets (technology briefs) on PIER program research in the Buildings End-Use Energy Efficiency area, and to distribute the briefs to interested constituencies in the energy efficiency and AEC (Architectural, Engineering and Construction) sectors. These fact sheets will also be placed in trade publications and journals that are read by people who could benefit from PIER research. Capitalizing on the position of Platts/McGraw-Hill Companies' media access to the energy and AEC sectors, PIER can improve the overall market exposure of completed research projects and ultimately improve end-use building energy efficiency in California.
100	PIER Buildings R&D Grant Program	Possible approval of an Interagency Agreement with the Trustees of the California State University for \$2,500,000. The Trustees will use the San Diego State University Foundation (SDSUF) to manage a semi-annual project solicitation, as well as award and manage small research project grants, for the PIER Buildings Team. This program is intended to be a pilot for the PIER Program, and other program areas may, in the future, choose to add the budget necessary for the SDSUF to solicit and manage research projects in their program areas.
101	NASEO Reimbursement Contract for Building Commissioning	
102	Energy Efficient Community Development Research Project	This contract will explore technologies and strategies to increase the energy efficiency and environmental quality of California communities. To meet this goal, the research will evaluate various technology and design options, analyze their impact on the existing utility infrastructure, and generate solutions to the institutional obstacles and market barriers that prevent their use. The project will conclude by translating this research into a set of practical case studies and guidelines for California planning, design and building professionals.
103	Preliminary Evaluation of Exterior Operable Window Shading Systems for Residential Buildings: Joseph Huang/LBNL	This simulation study determined that operable window shading devices (shutters) could have significant impacts on cooling energy and demand in residential buildings.
104	2006 Utility Energy Forum	Co-sponsor the Utility Energy Forum -- an annual conference, held in northern California, that brings together utility program managers, government energy program managers, and energy R&D researchers to discuss the best-available technologies and practices to help electricity and gas utility customers reduce their energy use through energy efficiency and renewable energy.
105	The Effects of Highly Reflective Coatings on Roof Top Units-Southern CA Edison	This simulation study by Southern California Edison found that the potential impact of high albedo coatings on rooftop AC units is modest.
106	Demonstrating Emerging Technologies for Residential Construction: Applications for Native American Tribes-Phase One	
107	Support for Standby Power Consumption Workshop-Karen Sharp:	
108	2004 ACEEE Summer Study on Energy Efficiency in Buildings Co-Sponsorship	
109	E Source Core Membership	<p>The E Source Core Membership includes:</p> <ul style="list-style-type: none"> • Member inquiry privileges • Online access to the full library of Core Technology and Core Markets & Strategy reports (16 to 20 reports per year) Participation in Web Conferences • 12 monthly e-mail issues of Tech News • 4 e-mail issues of Emerging Technology Currents • On-line access to the E Source Technology Atlas series • 1 seat at the annual E Source Forum • 1 seat at the Regional Strategic Issue Briefings Conference
110	E Source Technology Assessment Service	
111	Fabrication of a High Performance Fan for a High Efficiency Hot Arid Climate Air Conditioner	
112	2004 Emerging Technologies Conference	
113	Leading Edge Student Design Competition	The Leading Edge Student Design Competition provides a training vehicle for the architectural education community. The competition provides students with hands-on experience with energy-efficient building practices, stressing the incorporation of environmentally sound, renewable energy technologies and methods in architectural design. Students and instructors use the Competition as a framework to explore the innovative use of new materials and strategies for building, and integrating aesthetics and technology to create high-performance, cutting-edge architecture that benefits the environment and the marketplace.
114	2006 ACEEE Summer Study on Energy Efficiency in Buildings	This contract funds a \$20,000 co-sponsorship for the 2006 ACEEE Summer Study on Energy Efficiency in Buildings. The conference will be held August 13-18, 2006 at the Asilomar Conference Center in Pacific Grove, California.

#	TITLE	DESCRIPTION
115	Lighting for Tomorrow	This project enabled the Commission to participate in collaborative research concerning energy-efficiency of decorative lighting fixtures
116	Lighting for Tomorrow-Light Fixture Competition using Compact Fluorescent and Light Emitting Diode Lamps	Same as above.
117	Two-Year Membership Subscription to E Source Information Services	
118	Economic Evaluation and Peak Load Savings of Residential Central Air Conditioner Designs for Hot and Dry Climates	This simulation study by LBL based on the heat pump simulation model from ORNL found that hot dry optimized designs producing cooling without significant dehumidification would be cost effective in California.
119	Leading Edge Student Design Competition	
120	Tool Development for Peak Electrcial Demand Limiting Using Building Thermal Mass	
121	Scoping Study of Cold Seawater Source Cooling Systems for California	
122	Requirements Engineering Services for the PIER Buildings Program Area	
123	Coordination for the PIER Buildings Team's Lighting Research Project	
124	Hot Water Data Analysis and Field Test	
125	LBNL Indoor Health and Productivity Project-William Fisk: 5/15/02-5/31/03	
126	Preliminary Report on Applicability of Residential Ventilation Standards in CA	
127	Energy Efficient Digital Networks (EEDN): John Busch/LBNL	Task 1: Participate in electronics and network industry standards organizations. Task 2: Liaison with industry and other partners to coordinate efforts and focus on the most current opportunities.
128	Maintaining and Improving Energy Tariffs in the Home Energy Saver (HES) Web Site: Evan Mills/LBNL; Rich Brown/LBNL	
129	Producing and Marketing Sustainable and Energy-Saving Light Products	This project stimulates producing and marketing of sustainable and energy-saving lighting products by assisting and informing the CA Dept. of General Services' Green Buildings and procurement processes.
130	Microturbine Based Building Energy System	The purpose of this research is to develop a building heating, cooling, and power system that will greatly increase the efficiency of the microturbines it employs from a peak of 85% efficiency to an average of 55% efficiency.
131	Low Cost, Energy Saving Motor Controller for Residential and Industrial Buildings	The purpose of this project is to determine the feasibility of designing a single-phase supplied, three-phase motor controller for residential and industrial buildings.
132	Efficient Lighting by Sensing and Actuating with MEMS Smart Dust Motes	The purpose of this project is to research the feasibility of developing and testing 'Smart Dust Motes' for sensing, actuating and personalizing dimmable fluorescent lighting systems.
133	A New Physical Water Treatment Technology for Energy-Efficient Water-Cooled Air Conditioning Systems	The purpose of this project is to determine the feasibility of keeping condenser tubes free of both mineral and bio-fouling using a new technology that will allow water-cooled air conditioning systems to run significantly closer to the design efficiency (bio-fouling is the attachment of an organism or organisms to a surface in contact with water for a period of time).
134	Phase-Change Frame Walls (PCFWs) for Peak Demand Reduction, Load Shifting, and Energy Conservation in California	The purpose of this project is to research the feasibility of developing optimized phase-change structural-insulated panels that may reduce peak load air conditioning demand and provide energy savings in California's coastal and transitional climates.
135	Development of Microencapsulated Phase Change Materials for Chilled Water Systems	The goal of this project is to develop MPCMs that can be added to chilled water systems to increase the apparent specific heat of the chilled water.
136	Automating Window Sunshade Control: Toward the Zero Energy House	The purpose of this project is to demonstrate the feasibility of a new kind of microprocessor controlled thermostat that incorporates outdoor temperature sensors to control automated sunshades that reduce the heat load on air conditioners in the summer.
137	Advanced Onboard Diagnostics (AOD) for Air Conditioners and Heat Pumps	The goal of this project is to determine the feasibility of using an onboard air conditioner monitoring device to communicate performance problems and their solutions to system owners, service technicians, and energy providers.
138	Development of Single Fan Multi-Stack Exhaust Systems	The purpose of this project is to determine the feasibility of developing a single-fan multi-stack system which will greatly reduce the exhaust fan annual energy used for both existing and new facilities.
139	Prototype and Demonstration of a Light Emitting Diode (LED) Alternative to Screwbase Incandescent Lamps	The purpose of this project is to research the feasibility of constructing a light emitting diode (LED) lamp with a conventional screwbase and color control capability that could be used in existing incandescent light fixtures.
140	Desiccant Enhanced Indirect/Direct Evaporative Cooling System	The purpose of this project is to demonstrate the feasibility of a new air conditioning design that incorporates indirect/direct evaporative cooling and dehumidification using natural gas.
141	Integrating Evaporative Cooling with Dynamic Insulation for Occupant Thermal Comfort	The purpose of this project is to determine the feasibility of reducing peak cooling loads and increasing design day comfort in evaporatively cooled residences through the construction of a building that uses exfiltrating air.
142	Development of a Wireless Lighting Control Network	The purpose of this project is to demonstrate a wireless lighting control system based on miniature, low-power radio network technology that will enable better energy management control of building lighting.
143	IEM's Low Cost Building Performance Infrared Camera	The purpose of this project is to research the feasibility of incorporating cost-cutting innovations in the design of an infrared camera that will reduce the retail cost from \$12,000 to less than \$2,500, thereby expanding their use in energy audits of commercial buildings.
144	Building Geometry Simplification and Import into EnergyPlus	

#	TITLE	DESCRIPTION
145	Proof-of-Concept of a Dual-Fired (Solar and Natural Gas) Generator for Use in a Space Cooling System for Residential and Commercial Buildings	The purpose of this project is to develop a HVAC/hot water system capable of operating on natural gas and solar thermal energy that will reduce energy consumption up to 70%.
146	Field Feasibility Determination of a Novel Energy-Saving Refrigeration Controller	The purpose of this research is to determine the real-world feasibility of installing a demand-defrost controller on large scale refrigeration units to more accurately sense appropriate defrost times.
147	Spectrally Enhanced Incandescent Ceramic Incandescent Emitter	The purpose of this project is to determine the feasibility of using a new composite ceramic emitter design in incandescent bulbs to achieve a 300% increase in visible light per watt over standard incandescent bulbs.
148	Quantitative Building Cooling of Tile Roofs Coated with Solar IR Reflective Coatings	The purpose of this project is to research the feasibility of new infrared reflecting architectural coatings for on-site application to steep-pitched concrete or clay tile roofs.
149	Prototype and Demonstration of Vision-Tuned Fluorescent Lamps	The purpose of this project is to demonstrate the feasibility of developing more energy efficient fluorescent lamps in which a greater percentage of the radiant energy is used to produce light that is optimized for human vision.
150	Detecting Optimal Fan Pressure	The purpose of this project is to determine the feasibility of using a new algorithm for determining the optimal pressure at which to operate variable air volume (VAV) air-handling systems.
151	Instant Snap-in Load Shed Device for Incandescent Lighting	The purpose of this research is to determine the feasibility of developing a screw-in adaptor for incandescent lighting that enables a 30-50 percent reduction in electric energy consumption upon receipt of a powerline signal.
152	Demonstration of Energy Efficient Enhancement in Refrigeration Appliances by Incorporation of Practical, Low Cost Thermal Energy Storage	The purpose of this project is to demonstrate the feasibility of using a novel thermal-energy storage design to increase the energy efficiency of refrigeration and cooling appliances.
153	Self-Optimized Controllers for Air Conditioners	The purpose of this project is to determine the feasibility of developing a low-cost self-optimizing controller for single-phase air conditioners that reduces electrical consumption by 20% in a retrofit configuration.
154	The DaySwitch	The purpose of this research is to determine the feasibility of developing an inexpensive, easy to install, self-commissioning photosensor device called "DaySwitch" that will clip into existing lighting fixtures.
155	High-Efficiency Air-Conditioner on Single-Phase Electricity	The purpose of this project is to determine the feasibility of low-cost circuit designs that allow air conditioners with the more efficient 3 phase electric air-conditioning motors to operate from single-phase electrical supplies.
156	Non-Restrictive Pressure Relief Heat Trap	The purpose of this project is to determine the feasibility of using a spring-loaded design to produce non-restrictive pressure relieving heat traps to reduce standby losses of electric tank-type water heaters in California.
157	Development of an energy-Efficient, Ultra-Thin LED Luminaire	The purpose of this project is the demonstrate the feasibility a developing an energy efficient, ultra-thin light emitting diode (LED) based luminaire that will effectively replace downlights, accent lights and wall-wash luminaires.
158	Constant-Volume to Conversion Technology	The goal of this project is to test the feasibility of a Discharge Air Regulation Technique (DART) for cost-effectively converting constant volume heating, ventilating, and air-conditioning (HVAC) systems to variable flow operation.